Abstract

Removal of Cesium from Contaminated Water Using Alkali Fly Ash Permeable Reactive Barrier (AFA-PRB) Material

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Over the past 15 years, approximately one-half million sites with potential contamination have been reported to federal or state authorities. Of these, 217,000 sites still need remediation and new contaminated sites continue to appear each year. The most common type of contaminants are metals, solvents and petroleum products. Heavy metals are present in two-thirds of Department of Defense (DOD) and superfund sites and about 50% of Department of Energy (DOE) and Resource Conservation and Recovery Act (RCRA) sites.

AFA-PRB material was used to remove Cs from contamination water. Fly ash from three different sources were used to produce reactive barrier of different permeability. AFA-PRB materials with permeability 10^{-2} to 10^{-1} cm/sec were created. For reactive barrier material, permeability must be rapid, in the range of 10^{-2} to 10^{-1} cm/ sec. AFA - PRB from three ash sources with permeability of 10^{-1} were produced and crushed into pelletized form. Effectiveness of the various barriers were determined by batch and column tests.

Laboratory experiment indicates Cesium ion reduction from 1000 ppm to less than 2 ppm with 7 liters of solution and Cesium ion reduction from 10 ppm to less than 1 ppm at the permeability rates studied.